Stoller
Hanford Office

DOE-EM/GJ849-2005

299-W22-20 (A7843)
Log Data Report

Borehole Information:

Borehole: 299-W22-20 (A7843)			**Site:** 216-S-20 Crib		
Coordinates (WA State Plane)		**GWL (ft)[1]:** 233.4		**GWL Date:**	07/22/2004
North	**East**	**Drill Date**	**TOC[2] Elevation**	**Total Depth (ft)**	**Type**
133,879.246 m	567,593.094 m	06/1957	207.091m (676.13 ft)	301	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Carbon steel	0.67	10 3/4	9 3/4	0.5	0	332
The logger used a steel tape to determine both the outside and inside casing diameter. All measurements were rounded to the nearest 1/16-in. Bottom depth is reported from *Hanford Wells* (Chamness and Merz 1993).						

Borehole Notes:

Coordinates are reported from the "XYZ Location" list. *Hanford Wells* is the resource for drill date and depth. An e-tape was employed to determine depth-to-water. The borehole was swabbed before logging and no evidence of contamination above background levels was detected on the swab.

Logging Equipment Information:

Logging System:	Gamma 2A		**Type:** 35% HPGe (34TP20893A)
Calibration Date:	03/2004	**Calibration Reference:**	DOE/EM-GJ642-2004
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4 – repeat	
Date	07/23/04	08/05/04	08/06/04	08/06/04	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	77.0'	232.0'	126.0'	76.0'	
Finish Depth (ft)	1.0'	125.0'	77.0'	50.0'	
Count Time (sec)	200 s	200 s	200 s	200 s	
Live/Real	R	R	R	R	
Shield (Y/N)	NA	NA	NA	NA	
MSA Interval (ft)	1.0 ft	1.0 ft	1.0 ft	1.0 ft	
ft/min	NA	NA	NA	NA	
Pre-Verification	BA374CAB	BA376CAB	BA377CAB	BA377CAB	
Start File	BA374000	BA376000	BA377000	BA377050	
Finish File	BA374076	BA376107	BA377049	BA377076	

Log Run	1	2	3	4 – repeat	
Post-Verification	BA374CAA	BA376CAA	BA377CAA	BA377CAA	
Depth Return Error (in.)	0	-1”	NA	+1”	
Comments	Fine gain adjustment made after files 031, 052, and 067.	No fine gain adjustment made.	No fine gain adjustment made.	Repeat section.	

Logging Operation Notes:

Pre- and post-survey verification measurements were acquired in the Amersham verifier SN 082. Logging was performed with a centralizer on the sonde. Maximum sonde depth achieved was 232.0 ft approximately 1-ft above groundwater level.

Analysis Notes:

Analyst:	McCain	Date:	12/22/04	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected in the Amersham verifier (SN 082) at the beginning and end of each day. Both net count rate and FWHM were compared to verification criteria for gamma activity at the 609, 1461, and 2615 keV energy levels. In general, the spectra exhibited minor loss of efficiency and peak spreading, particularly at higher gamma energies. Net count rates for the 2615 peak were slightly below the lower control limit, but well within the 20% HASQARD criteria. Visual examination of the verification spectra indicated the detector is functioning normally, and the results are provisionally accepted.

Log spectra for the SGLS were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Pre-run verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G2Amar04.xls), using parameters determined from analysis of recent calibration data. Zero reference was top of casing. The casing configuration was assumed to consist of 8-in. casing from the surface to 300 ft. A casing thickness of 0.322 in. was used over the entire borehole. This represents the thickness for 8-in. schedule-40 steel pipe. The maximum log depth was 232 ft. No water correction was applied.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included for natural radionulcides. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation.

Results and Interpretations:

^{137}Cs was the only man-made radionuclide detected in this borehole. ^{137}Cs was detected near the ground surface with a maximum concentration of 0.4 pCi/g at 2-ft depth and sporadically at or near the MDL (0.2 to 0.3 pCi/g) below 3 ft. Examination of log spectra show a well-defined peaks at 662 keV in the gamma spectra from 2 and 3 ft. Other occurrences of ^{137}Cs appear to be due to statistical fluctuations.

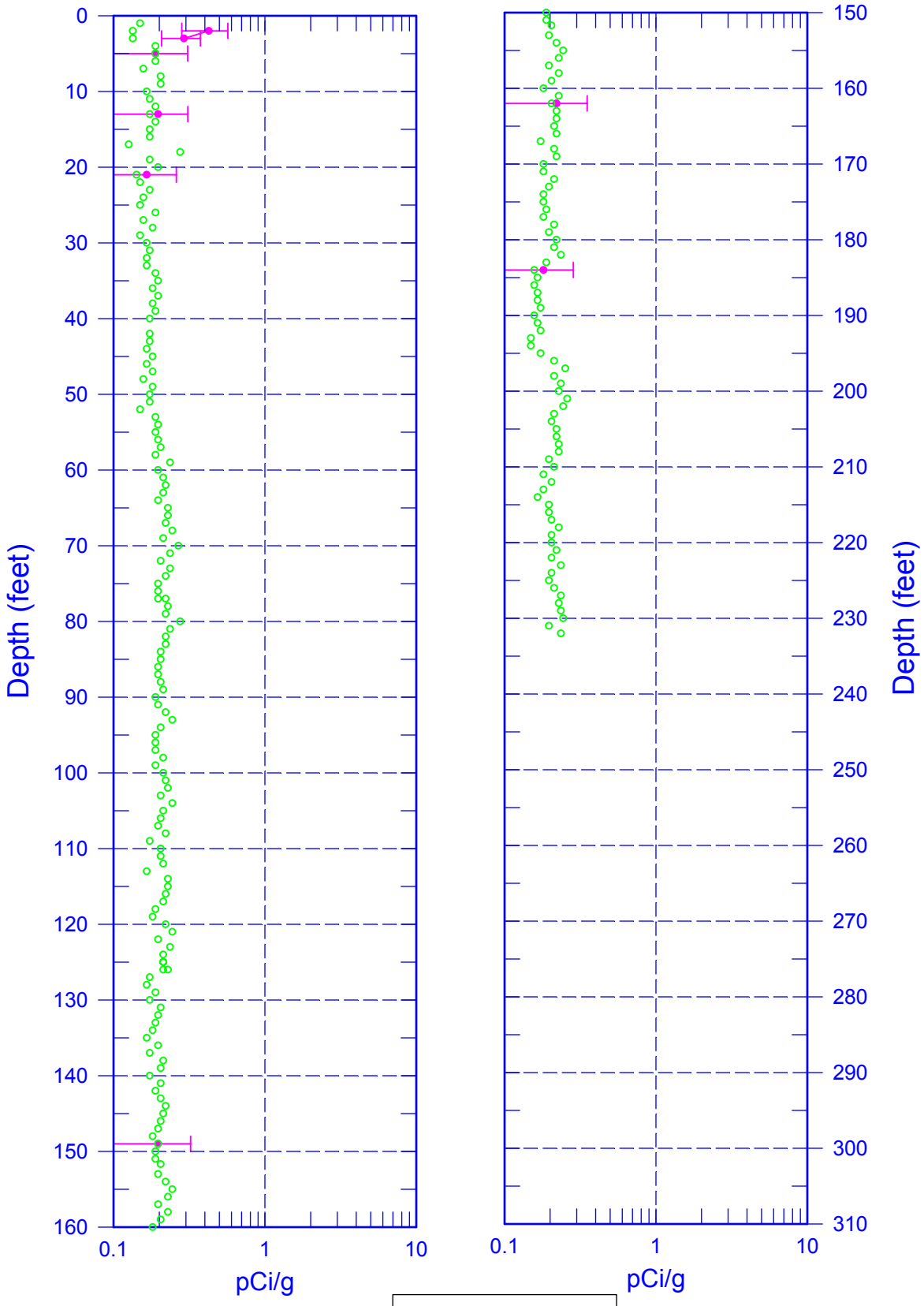
The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the natural radionuclides (609, 1461, 1764, and 2614 keV).

Plots of historical gross gamma data from 1963, 1968, and 1976 are included. The 1963 log shows a gamma anomaly between 155 and 165 ft. In 1968, the activity in the anomaly had declined to about half the 1963 level; by 1976, the anomaly had essentially disappeared. The decay rate suggests this contamination may have been ^{60}Co, but there is no evidence of any contamination at that depth in the SGLS log.

References:

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, Pacific Northwest Laboratory, Richland, Washington.

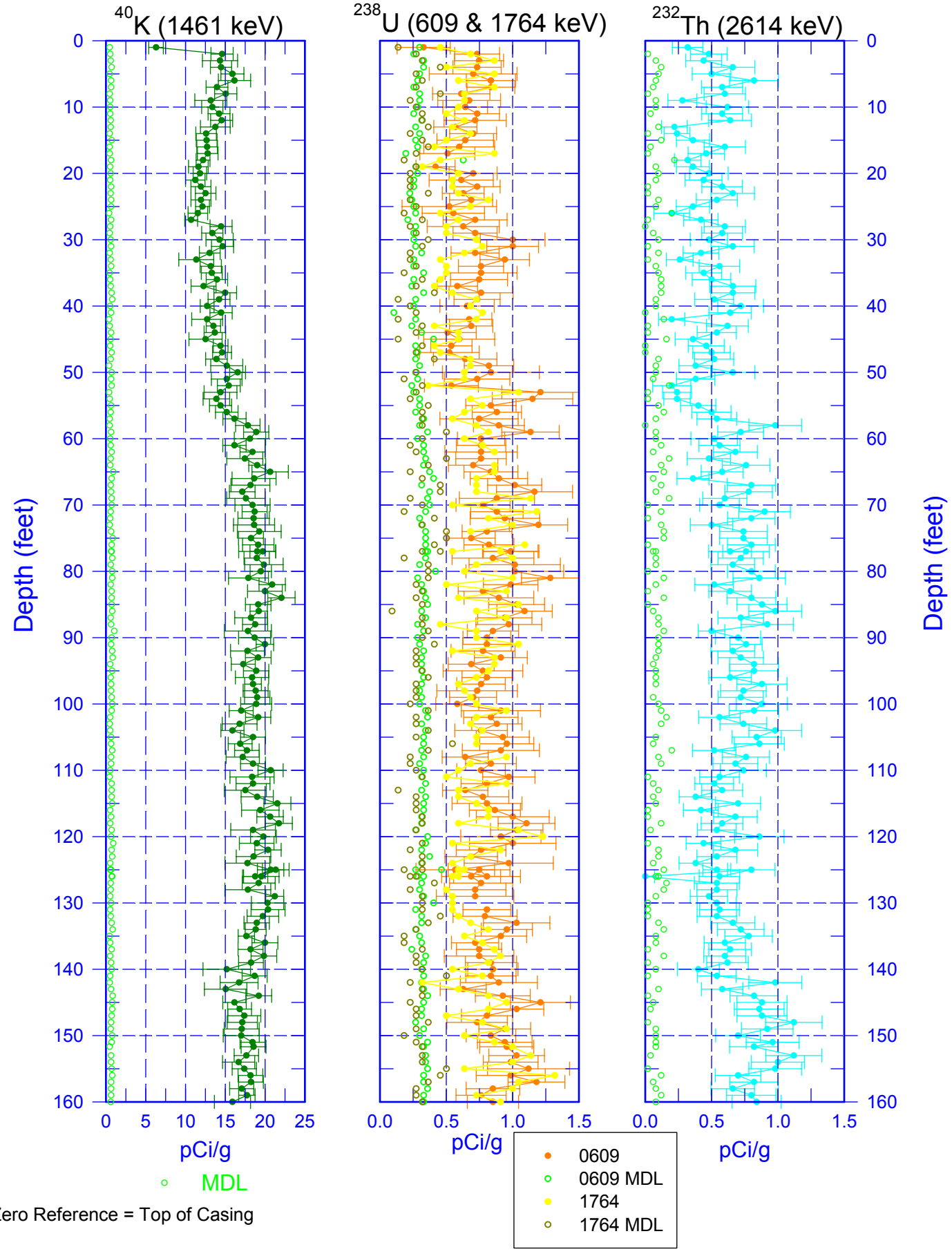
299-W22-20 (A7843)
Man-Made Radionuclides



Zero Reference = Top of Casing

Date of Last Logging Run 8/06/2004

299-W22-20 (A7843)
Natural Gamma Logs



Zero Reference = Top of Casing

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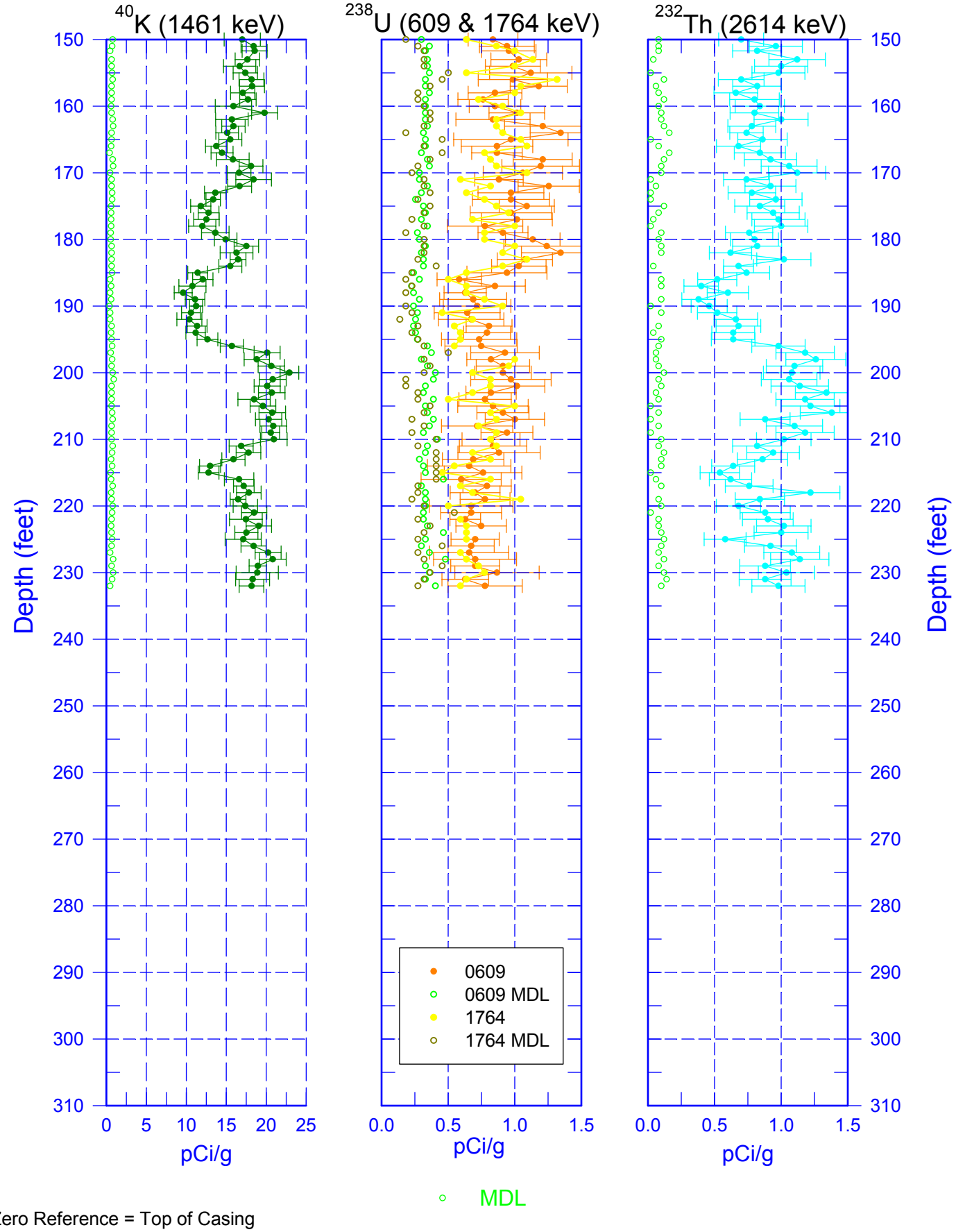
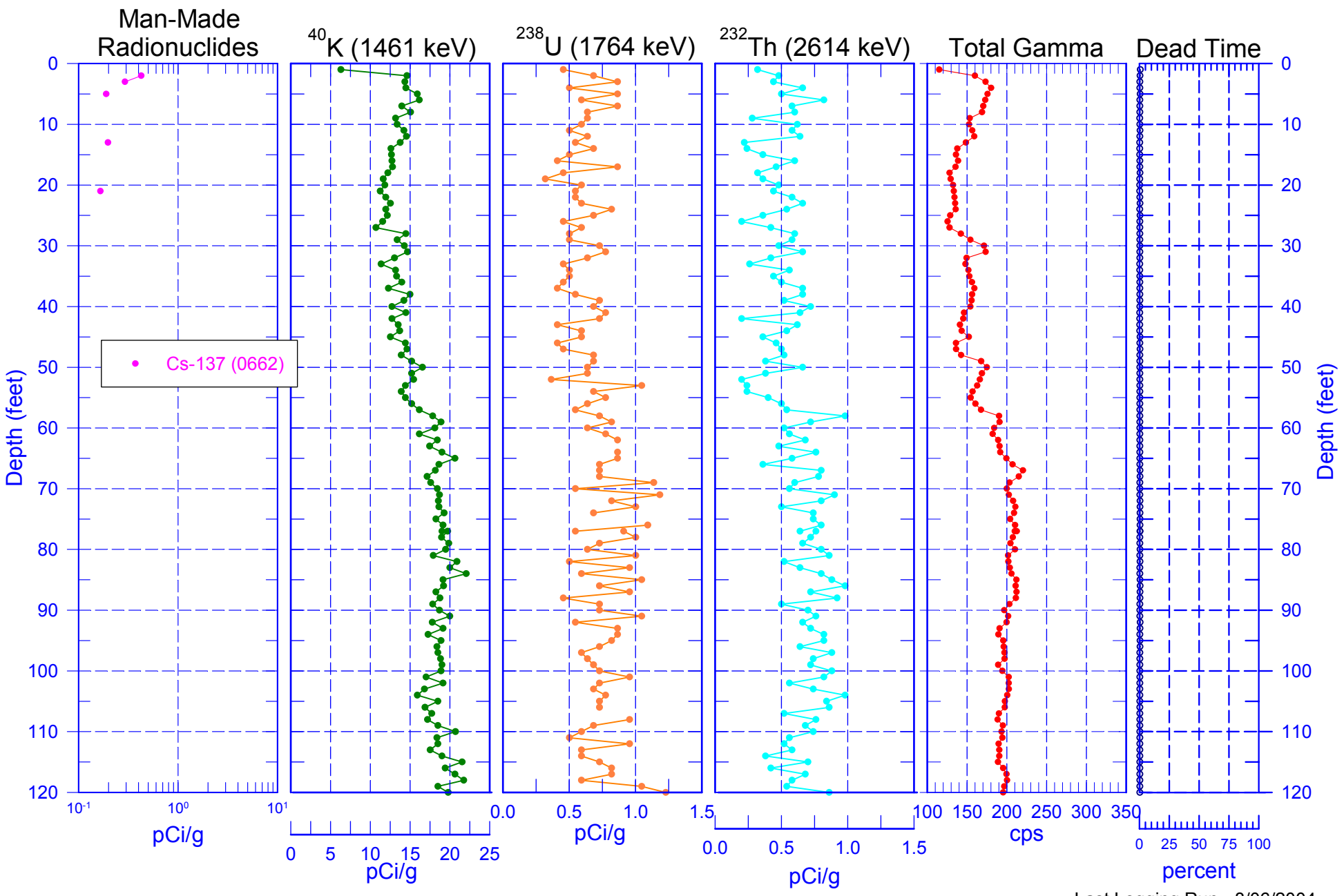
Natural Gamma Logs



Zero Reference = Top of Casing

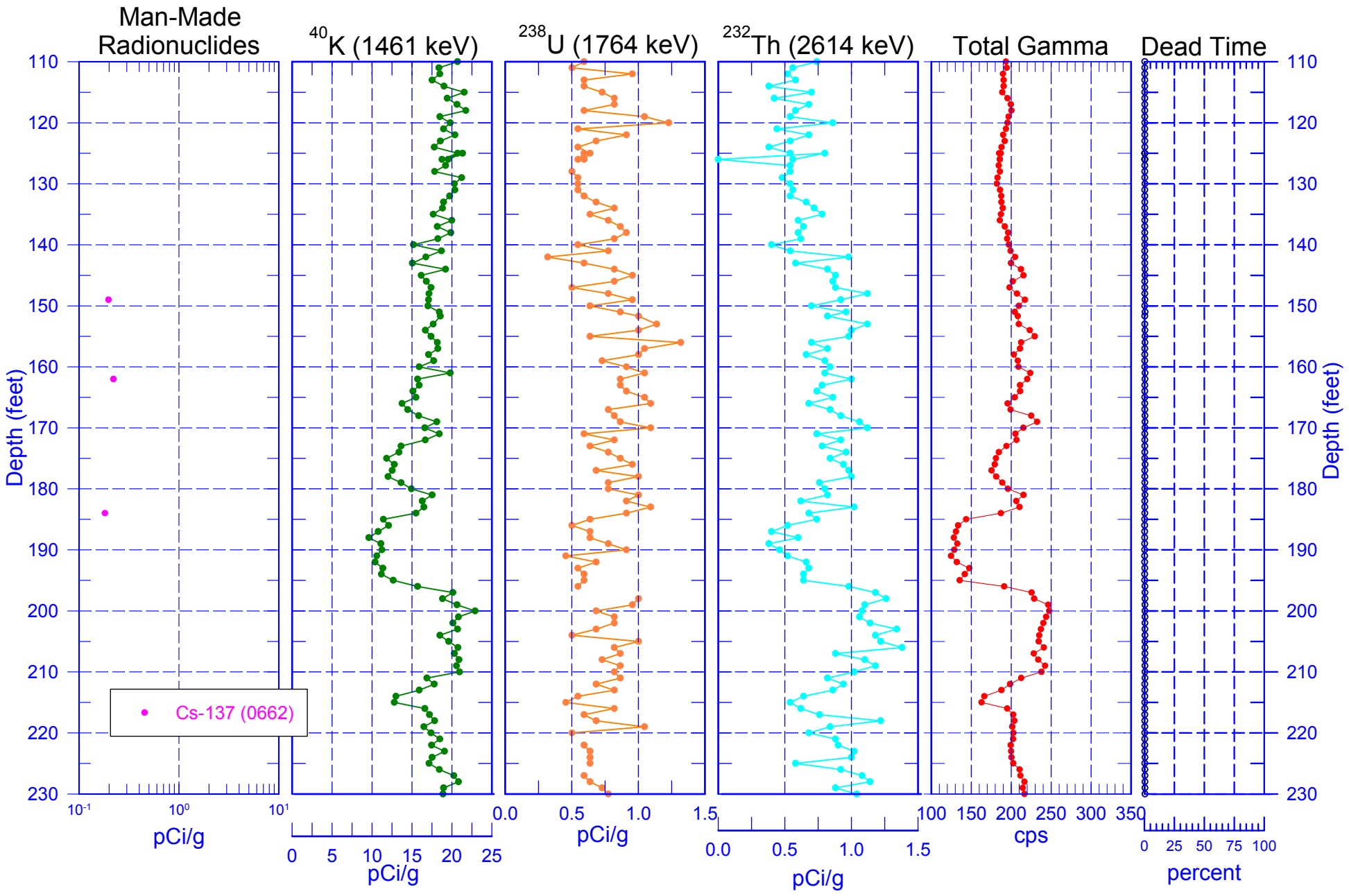
299-W22-20 (A7843) Combination Plot



Zero Reference = Top of Casing

Last Logging Run - 8/06/2004

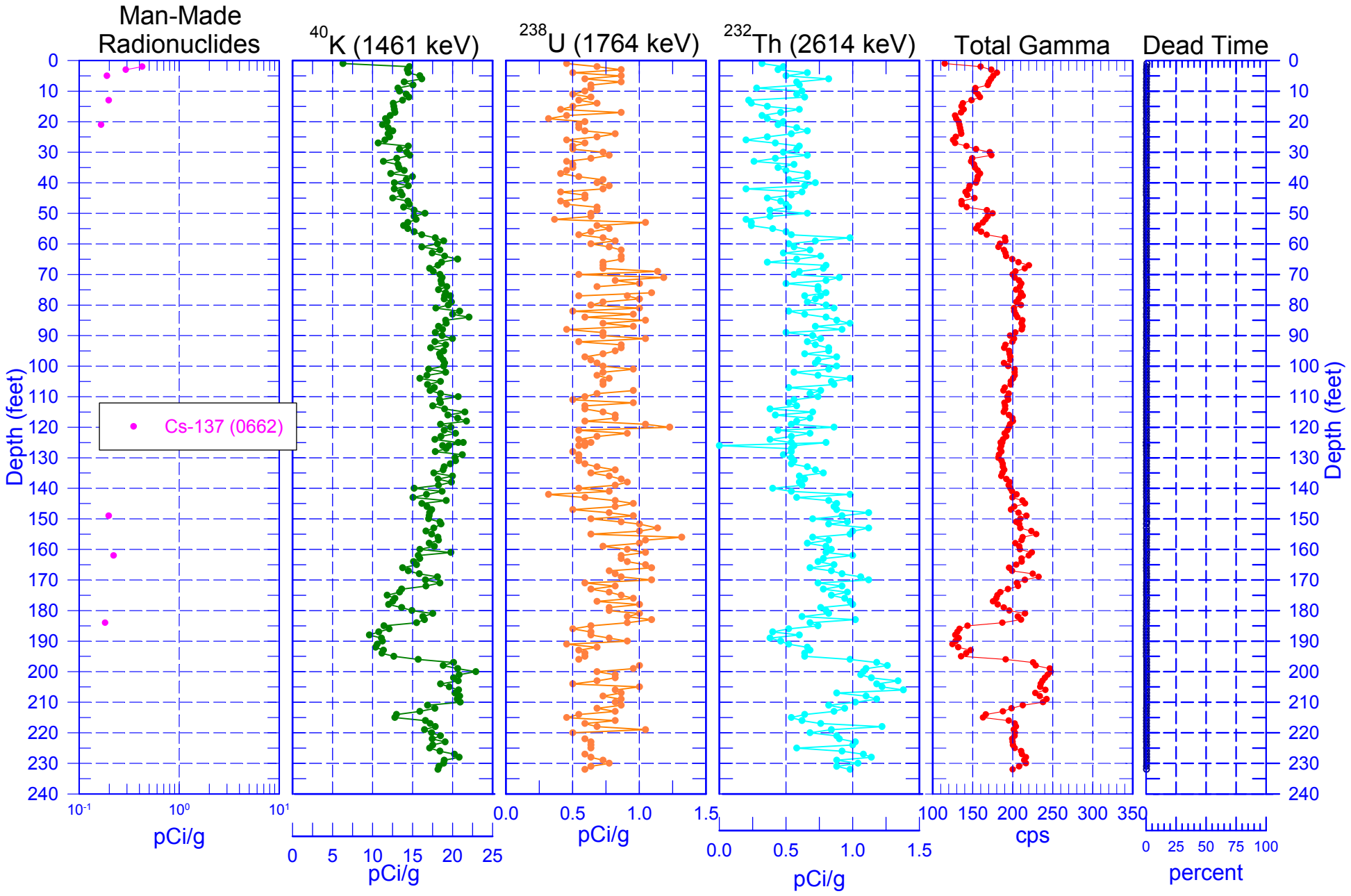
299-W22-20 (A7843) Combination Plot



Zero Reference = Top of Casing

Last Logging Run - 8/06/2004

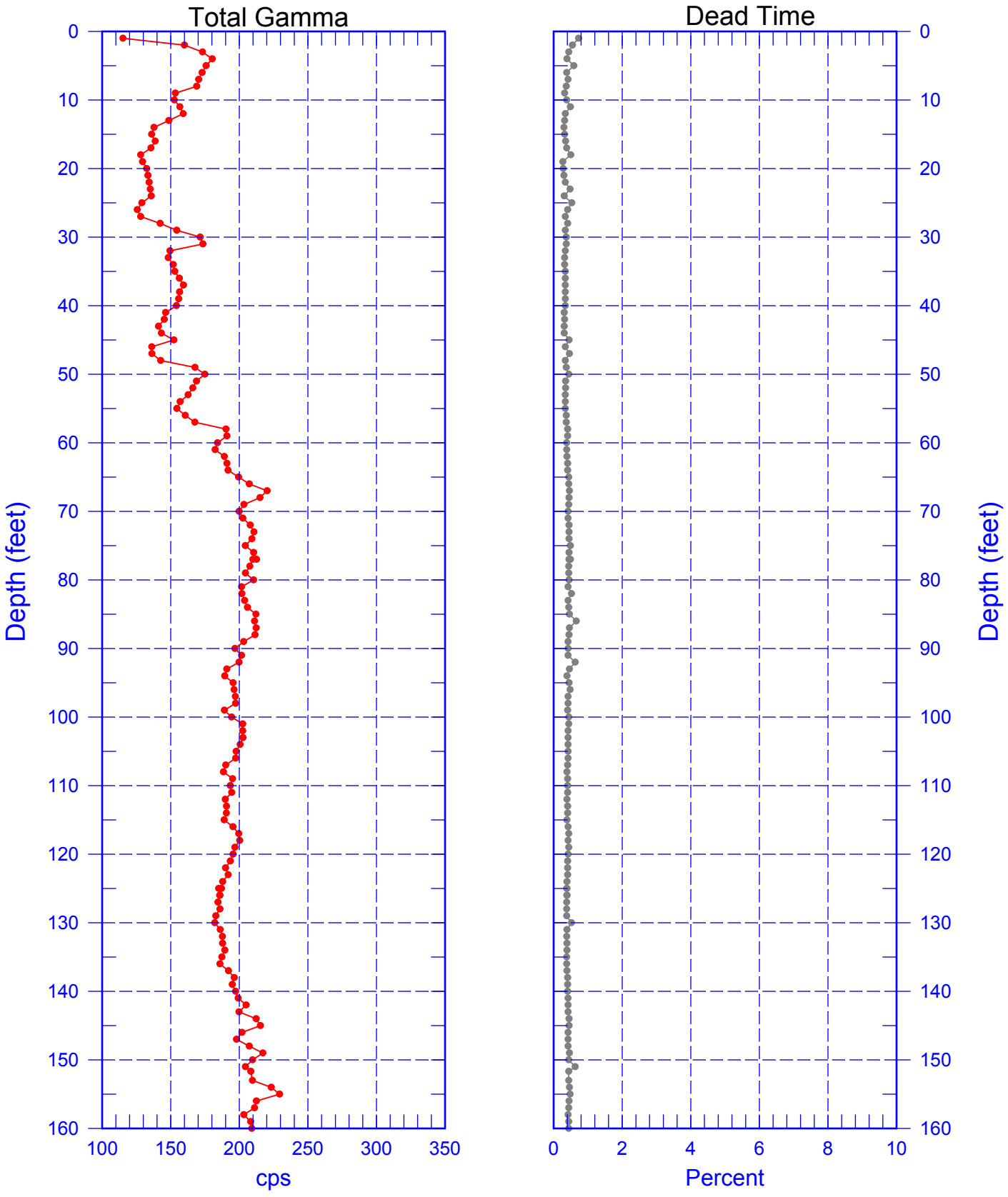
299-W22-20 (A7843) Combination Plot



Zero Reference = Top of Casing

Date of Last Logging Run 8/06/2004

299-W22-20 (A7843)
Total Gamma & Dead Time



Zero Reference = Top of Casing

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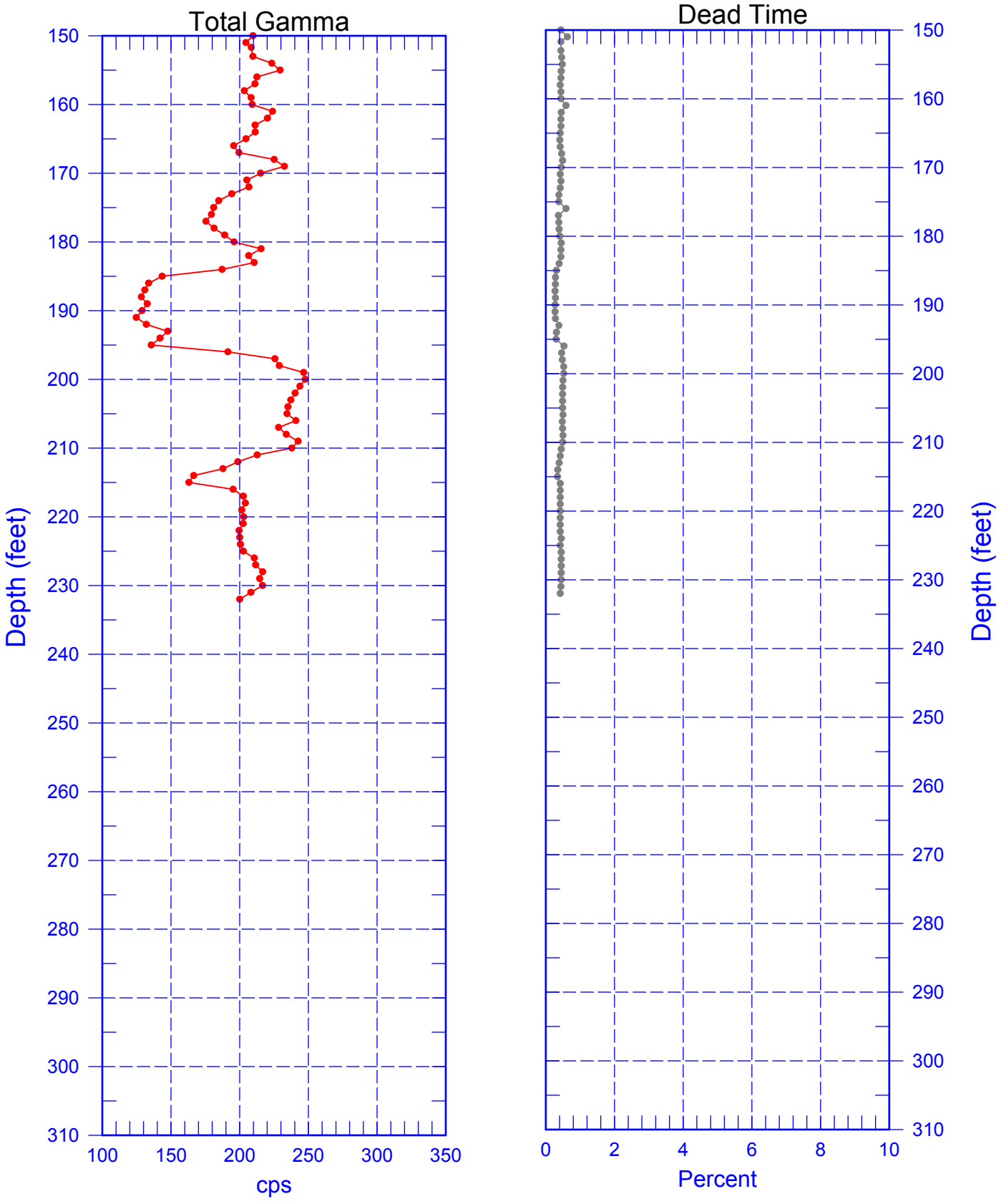
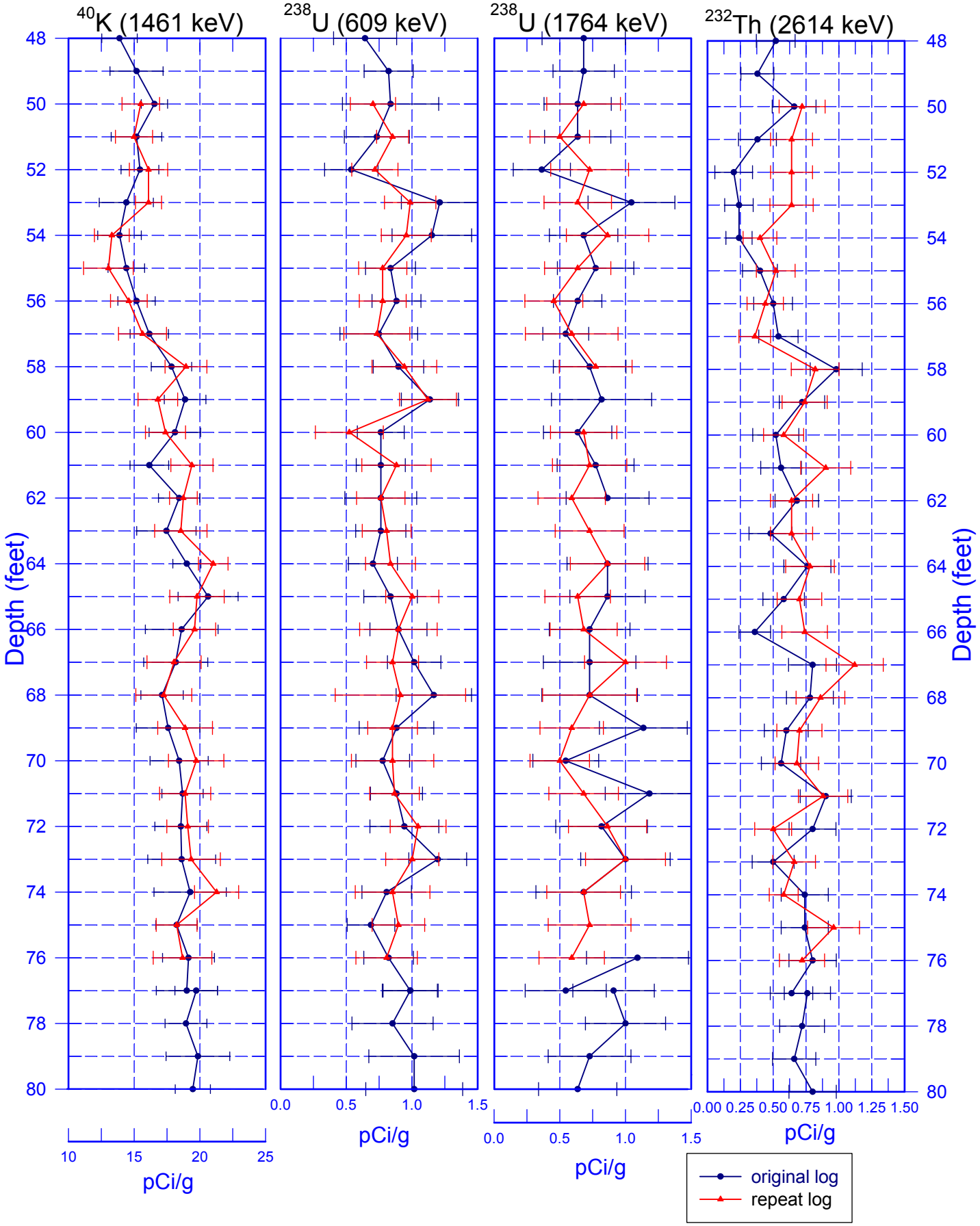


Zero Reference = Top of Casing

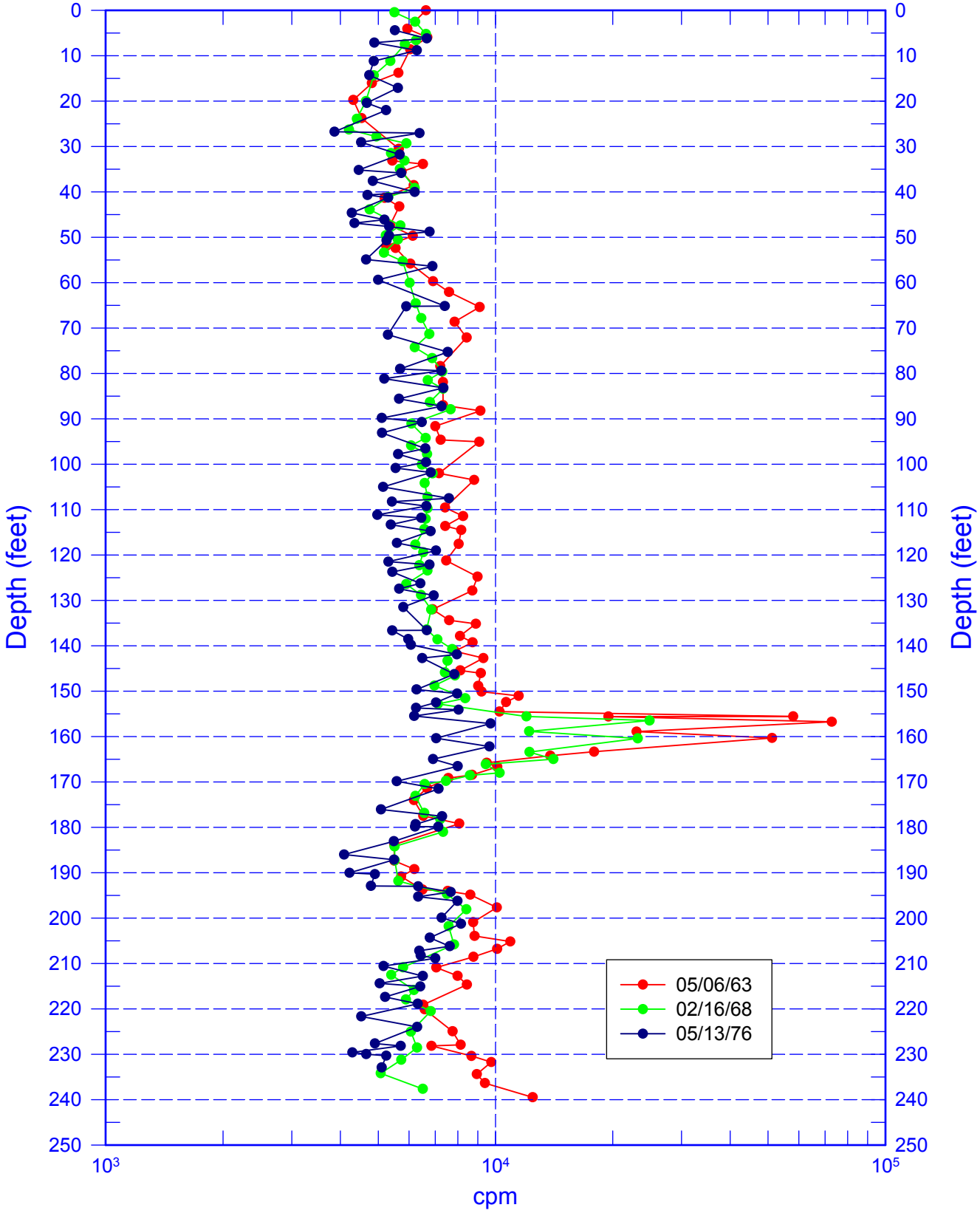
Last Logging Run - 8/06/2004

299-W22-20 (A7843)

Rerun of Natural Gamma Logs (50 to 76 ft)



299-W22-20 (A7843)
Historical Gross Gamma Logs



Zero Reference = Top of Casing

Date of Last Logging Run - 8/06/2004